

REMARKS

Claims 1, 2 and 5 have been amended to recite that data from the memory modules is copied to the hard disk drive at predetermined time periods. These amendments are supported throughout the specification, for example, at page 4, lines 13-15. These claims have also been amended for clarity. Claims 12-14 have been amended to recite "shorting pins" in place of "short pins." Applicant respectfully submits that no new matter has been added.

Claim Rejections

Claim 1 --- 35 U.S.C. § 103(a)

Claim 1 has been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the so-called Applicant's Admitted Prior Art ("AAPA") in view of U.S. Pat. Pub. No. 2002/0069317 to Chow *et al.* ("Chow") and U.S. Patent No. 5,859,545 to Thörnblad. Applicant traverses this rejection.

Chow does not disclose or suggest at least a hard disk device to which the data stored in said memory modules is temporarily copied at predetermined time periods, as recited in the claim. The Examiner alleges that the nonvolatile storage module of Chow is analogous to a hard disk device. In fact, Chow teaches away from the use of hard disk drives in favor of solid state devices, citing the shortcomings of hard disk drives in RAID applications. See paragraphs [0009-0010]. Conversely, the AAPA teaches away from the use of additional solid state memory as mirror memory due to the increases in expense and mounting area resulting from the increased use of memory modules. See Applicant's specification, page 4, lines 3-6. Thus, the teachings of the AAPA and Chow conflict.

The Examiner relies on Thörnblad only to allegedly disclose buffer circuits as recited in the claim. Thörnblad, however, does not resolve the conflicting teachings of Chow and the AAPA.

Further, the Examiner concedes that the AAPA does not disclose or suggest a control device which, when an arbitrary memory module is being replaced, switches an operational mode of a ring bus from a unidirectional bus capable of sending and receiving a signal unidirectionally, to a bi-directional bus capable of sending and receiving a signal bi-directionally, as recited in the claim.

The Examiner notes that two unidirectional buses are provided and alleges that, when taken together, the two unidirectional buses form a bidirectional bus (see Office Action, page 3, paragraph 4). However, as well known to one of ordinary skill in the art, a bidirectional bus is a single bus structure which provides bidirectional communication on common lines rather than two separate bus structures which each provide communication in only one direction. Thus, the AAPA does not disclose or suggest a unidirectional bus capable of bidirectional operation, and therefore also does not disclose a control device as claimed for such a bus.

In view of the above, it would not be obvious to one of ordinary skill in the art at the time the invention was made to combine these references as attempted by the Examiner to result in the invention as claimed.

Accordingly, claim 1 is patentable over the combination of Chow, Thörnblad and the AAPA.

Claims 2, 15, 17 and 19 --- 35 U.S.C. § 103(a)

Claims 2, 15, 17 and 19 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of U.S. Pat. No. 5,586,291 to Lasker *et al.* ("Lasker"). Applicant traverses this rejection.

With regard to claim 2, Applicant respectfully submits that, as set forth above in the arguments for claim 1, the AAPA does not disclose or suggest a control device which, when an arbitrary memory module is being replaced, switches an operational mode of a ring bus from a unidirectional bus capable of sending and receiving a signal unidirectionally, to a bi-directional bus capable of sending and receiving a signal bi-directionally, as recited in claim 2. Lasker does not cure the deficiencies of the AAPA.

Lasker is directed to a disk storage and cache memory system which allows faster data access by using volatile memory rather than disk storage for working data access (Abstract). However, neither the portions of Lasker cited by the Examiner, nor any other portion of Lasker, discloses or suggests the above-noted features deficient in the AAPA. Since the combination of Lasker and the AAPA does not disclose or suggest all the claimed features, it would not have been obvious to one of ordinary skill in the art at the time the invention was made to combine the references as attempted by the Examiner.

Therefore, claim 2 is patentable over the combination of Lasker and the AAPA. Claims 15, 17 and 19, which depend from claim 2, are patentable at least by virtue of their dependence.

Claims 5, 8, 16, 18 and 20 --- 35 U.S.C. § 103(a)

Claims 5, 8, 16, 18 and 20 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Lasker and U.S. Patent No. 6,411,539 to Funaba *et al.* ("Funaba"). Applicant traverses this rejection.

With regard to claim 5, the combination of the AAPA, Lasker and Funaba does not disclose or suggest at least a hard disk device to which the data stored in said memory modules is copied at predetermined time periods, a storage to which data stored in an arbitrary memory module is temporarily copied, and a control device which, when an arbitrary memory module is being replaced, detects an address space of said memory module being replaced, copies data corresponding to the detected address space from said hard disk device to said storage, and accesses a memory area in said storage corresponding to the detected address space at the time when an access to said memory module being replaced is requested, as recited in claim.

As established above, the teachings of the AAPA and Chow conflict since Chow teaches away from the use of hard disk drives in favor of solid state devices, and the AAPA teaches away from the use of additional solid state memory as mirror memory due to the increase in expense and mounting area resulting from the increased use of memory modules.

Lasker, on the other hand, is directed to a disk storage and cache memory system which allows faster data access by using volatile memory rather than disk storage for working data access (Abstract). Thus, not only does Lasker fail to resolve the conflicting teachings of the AAPA and Chow, but Lasker also fails to disclose or suggest the above-noted features deficient in the combination.

Therefore, it would not have been obvious to one of ordinary skill in the art at the time the invention was made to combine the references as attempted by the Examiner since combination of the AAPA, Lasker and Funaba fails to disclose or suggest at least a hard disk device to which the data stored in said memory modules is copied at predetermined time periods, a storage to which data stored in an arbitrary memory module is temporarily copied, and a control device which, when an arbitrary memory module is being replaced, detects an address space of said memory module being replaced, copies data corresponding to the detected address space from said hard disk device to said storage, and accesses a memory area in said storage corresponding to the detected address space at the time when an access to said memory module being replaced is requested, as recited in claim 5.

Accordingly, claim 5 is patentable over the combination of the AAPA, Lasker and Funaba. Claims 8, 16, 18 and 20, which depend from claim 5, are patentable at least by virtue of their dependence.

Claims 3 and 6 --- 35 U.S.C. § 103(a)

Claims 3 and 6 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Chow and Thörnblad, and further in view of Funaba. Applicant traverses this rejection.

As established above in the arguments for claim 1, from which claims 3 and 6 depend, the combination of the AAPA, Chow and Thörnblad does not disclose or suggest at least a hard disk device to which the data stored in said memory modules is temporarily copied, and a control device which, when an arbitrary memory module is being replaced, switches an operational

mode of a ring bus from a unidirectional bus capable of sending and receiving a signal unidirectionally, to a bi-directional bus capable of sending and receiving a signal bi-directionally, as incorporated into the claims by virtue of their dependence. Funaba does not cure these deficiencies.

Funaba is directed to a memory system capable of controlling signal waveform disturbances due to signal reflection (column 3, lines 17-19). The Examiner relies on Funaba only to allegedly disclose a short-circuit device. However, neither the portions of Funaba cited by the Examiner, nor any other portions of Funaba, disclose or suggest the above-noted features deficient in the AAPA-Chow-Thörnblad combination.

Therefore, it would not have been obvious to one of ordinary skill in the art at the time the invention was made to combine the references as attempted by the Examiner since the combination would not result in the features claimed by Applicant.

Accordingly, claims 3 and 6 are patentable over the combination of the AAPA, Chow, Thörnblad and Funaba.

Claims 4 and 7 --- 35 U.S.C. § 103(a)

Claims 4 and 7 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Lasker and Thörnblad, and further in view of Funaba. Applicant traverses this rejection.

As established above in the arguments for claim 2, from which claims 4 and 7 depend, the combination of the AAPA, Lasker and Thörnblad does not disclose or suggest at least a control device which, when an arbitrary memory module is being replaced, switches an

operational mode of a ring bus from a unidirectional bus capable of sending and receiving a signal unidirectionally, to a bi-directional bus capable of sending and receiving a signal bi-directionally, as incorporated into the claims by virtue of their dependence. Funaba does not cure these deficiencies.

As noted above, Funaba is directed to a memory system capable of controlling signal waveform disturbances due to signal reflection (column 3, lines 17-19). Funaba, however, does not disclose or suggest the above-noted features deficient in the AAPA-Lasker-Thörnblad combination.

Therefore, it would not have been obvious to one of ordinary skill in the art at the time the invention was made to combine the references as attempted by the Examiner since the combination would not result in the features claimed by Applicant.

Accordingly, claims 4 and 7 are patentable over the combination of the AAPA, Lasker, Thörnblad and Funaba.

Claim 9 --- 35 U.S.C. § 103(a)

Claim 9 has been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Chow, Thörnblad and Funaba, and further in view of U.S. Pat. No. 6,487,623 to Emerson *et al.* ("Emerson"). Applicant traverses this rejection.

As established above in the arguments for claim 1, from which claim 9 depends, and in the arguments for claim 3, the combination of the AAPA, Chow, Thörnblad and Funaba does not disclose or suggest at least a hard disk device to which the data stored in said memory modules is temporarily copied, and a control device which, when an arbitrary memory module is being

replaced, switches an operational mode of a ring bus from a unidirectional bus capable of sending and receiving a signal unidirectionally, to a bi-directional bus capable of sending and receiving a signal bi-directionally, as incorporated into the claims by virtue of their dependence. Emerson does not cure these deficiencies.

The Examiner relies on Emerson to allegedly disclose an FET switch as a short-circuit device for short-circuiting or opening bus connections which are disconnected by removing a memory module. Emerson, however, discloses FET isolation buffers 160 which provide isolation of a RAM module 106 from a memory bus 105a for removal of the RAM module 106 (column 7, lines 12-25). Thus, Emerson does not cure the deficiencies of the AAPA-Chow-Thörnblad-Funaba combination.

Further, Emerson merely discloses the use of FET isolation buffers to isolate a connector containing a memory module for removal (column 8, line 50-, line 45). In fact, Emerson is directed to a parallel bus structure as illustrated in Fig. 1 of Applicant's specification rather than the recited ring bus structure and thus is silent as to providing a short-circuit or an open circuit in the bus structure as recited in the claims.

In view of the above, claim 9 is patentable over the combination of the AAPA, Chow, Thörnblad, Funaba and Emerson.

Claim 10 --- 35 U.S.C. § 103(a)

Claim 10 has been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Lasker, Thörnblad and Funaba, and further in view of Emerson. Applicant traverses this rejection.

Claim 10 incorporates the features of claims 2 and 4 from which it depends, and contains features similar to the features recited in claim 9. Accordingly, for reasons similar to the reasons set forth above in the arguments for claims 2, 4 and 9, claim 10 is patentable over the combination of the AAPA, Lasker, Thörnblad and Funaba.

Claim 11 --- 35 U.S.C. § 103(a)

Claim 11 has been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Lasker, Thörnblad and Funaba, and further in view of Emerson. Applicant traverses this rejection.

Claim 11 incorporates the features of claim 5 from which it depends, and contains features similar to the features recited in claim 9. Accordingly, for reasons similar to the reasons set forth above in the arguments for claims 5 and 9, claim 11 is patentable over the combination of the AAPA, Lasker, Thörnblad, Funaba and Emerson.

Claim 12 --- 35 U.S.C. § 103(a)

Claim 12 as been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Chow, Thörnblad and Funaba, and further in view of U.S. Pat. Pub. No. 2002/0083255 to Greeff *et al.* ("Greeff"). Applicant traverses this rejection.

As established above in the arguments for claim 1, from which claim 12 depends, and the arguments for claim 3, the combination of the AAPA, Chow, Thörnblad and Funaba does not disclose or suggest at least a hard disk device to which the data stored in said memory modules is temporarily copied, and a control device which, when an arbitrary memory module is being replaced, switches an operational mode of a ring bus from a unidirectional bus capable of

sending and receiving a signal unidirectionally, to a bi-directional bus capable of sending and receiving a signal bi-directionally, as incorporated into the claims by virtue of their dependence. Greeff does not cure these deficiencies.

Greeff is directed to eliminating reflections caused by electrical stubs in a bus system by using a segmented bus wherein the bus segments are connected through switches (Abstract). Greeff, however, fails to disclose or suggest at least the above-noted features deficient in the AAPA-Chow-Thörnblad-Funaba combination.

Further, Greeff does not disclose or suggest wherein said short-circuit device is a connector, which is provided in association with said memory modules, respectively, and is provided with shorting pins which short-circuits bus connection, which is disconnected by removing said memory module, at the time when said memory module is removed, and releases the short-circuit at the time when said memory module is inserted, as recited in the claim.

The Examiner relies on Greeff to allegedly disclose a connector as a short-circuit device for short-circuiting or opening bus connections which are disconnected by removing a memory module. Greeff discloses that a low-cost jumper or other simple continuity module may be used in place of a memory module to maintain the continuity of the bus (paragraph [0069]). However, as recited by claim, an additional module or connector is not required to maintain continuity of the bus.

As recited in the claim, the connector is provided in association with the memory modules and is provided with shorting pins which short-circuit the bus connection. In other words, the connector normally receives the memory module also provides the short-circuiting

bus connection when the memory module is removed. Thus, no additional module or connector need be inserted as is required by the disclosure of Greeff. Thus, Greeff does not cure the deficiencies of the AAPA-Chow-Thörnblad-Funaba combination.

Accordingly, claim 12 is patentable over the combination of the AAPA, Chow, Thörnblad, Funaba and Greeff.

Claim 13 --- 35 U.S.C. § 103(a)

Claim 13 has been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Lasker, Thörnblad and Funaba, and further in view of Greeff. Applicant traverses this rejection.

Claim 13 incorporates the features of claims 2 and 4 from which it depends, and contains features similar to the features recited in claim 12. Accordingly, for reasons similar to the reasons set forth above in the arguments for claims 2, 4 and 9, claim 12 is patentable over the combination of the AAPA, Lasker, Thörnblad, Funaba and Greeff.

Claim 14 --- 35 U.S.C. § 103(a)

Claim 14 has been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Lasker, Thörnblad and Funaba, and further in view of Greeff. Applicant traverses this rejection.

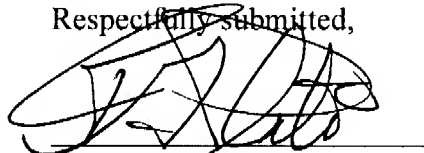
Claim 14 incorporates the features of claim 5 from which it depends, and contains features similar to the features recited in claim 12. Accordingly, for reasons similar to the reasons set forth above in the arguments for claims 5 and 12, claim 14 is patentable over the combination of the AAPA, Lasker, Thörnblad, Funaba and Greeff.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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